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FINAL REPORT OF DIPLOMA PROJECT

FACULTY OF MECHANICAL ENGINEERING

FRACTURE MECHANICS AND ITS APPLICATION TO WOOD

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Since the work leading to this report started a year ago, the author received assistance and encouragement from his lecturers, colleagues and beloved family. The assistance obtained made the report more complete than would otherwise have been possible. The author wishes to acknowledge therefore, a few contributions. Mr. Mohd Salleh b. Mohd Noh, the then Course Tutor of the Advanced Diploma, Dept. of Civil Engineering and Mrs. Kafilah bt. Din, who as the project advisor and a second examiner respectively, read and corrected the report. Special thanks is due to Dr. Faqir Gul for his tireless effort that led to the successful testing programmes. Acknowledgements are also due to Mr. Abu and Mr. Yusuf for their assistance received at the laboratory.

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Using fracture mechanics one can predict the strength of wood that contains knots, notches, cracks and other discontinuities. The author undertakes to introduce the reader the fundamentals of fracture mechanics and its application to wood incorporating a small-scale experiment using the standard test procedures (BS 5447: 1977).

It is a commonly held belief that the isotropic solution can also give satisfactory results for most orthotropic materials. For isotropic materials there are three fracture values in respect to the three modes of crack propagation. But, for wood that is modelled as an orthotropic materials, six different fracture toughness values exist for every one of the three modes.

Two standard types of test piece that are currently recommended in the BS 5447: 1977 were used (i.e. SEN bend and CTS test piece). The species of wood used was Keruing. For the purpose of the study, specimen were cut so that it consists of crack parallel and perpendicular to grain. Test results show an agreeable K_{Ic} value for crack parallel to grain from the CTS test piece. The value obtained was 0.56 $MN^{-3/2}$ i.e. within the range of 0.5 - 1 MN $m^{-3/2}$

LIST OF FIGURES AND TABLES
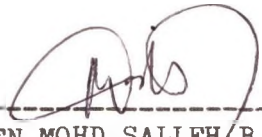
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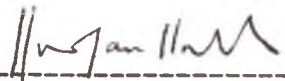
A report is submitted herein to the School of Engineering, MARA
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ments for the award of the Advanced Diploma of Civil Engineering .

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